INSTRUCTION MANUAL

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MODEL RTH-F18
RF TUNING UNIT

designed for use with the

TMR-18 TELEMETRY RECEIVER

DEI *Defense Electronics, Inc.*
RESEARCH ■ DEVELOPMENT ■ MANUFACTURING
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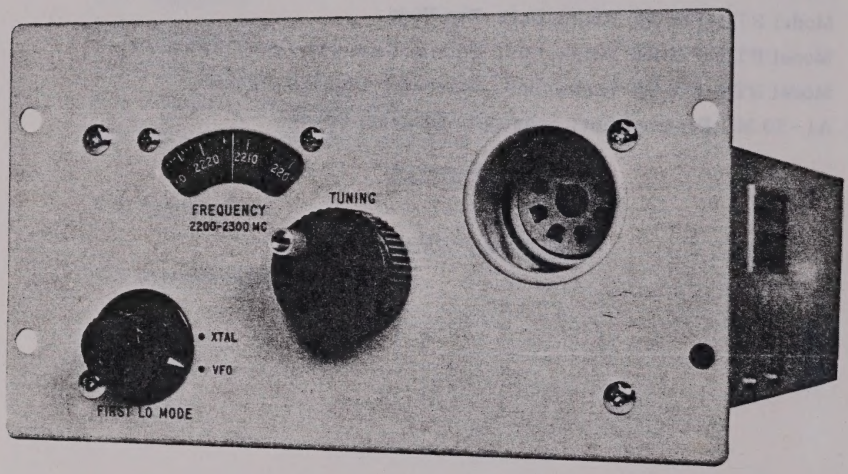

FIGURE 1-1. MODEL RTH-F18 RF TUNING UNIT

SECTION I
GENERAL DESCRIPTION

1-1 INTRODUCTION

The Model RTH-F18 RF Tuning Unit is designed for use with the Model TMR-18 Telemetry Receiver to meet the highest performance needs of specialized telemetry applications. Noise figures of less than eleven db are obtained over the entire tuning range of 2200-2300 mc.

The tuning unit functions as the rf preselector, first local oscillator, first mixer, and the 30-mc preamplifier for the Model TMR-18 Telemetry Receiver. The tuning unit converts the received signal to a 30-mc intermediate frequency which is coupled to the 30-mc i-f amplifier in the TMR-18 receiver. Automatic gain control voltages from the receiver are applied to the 30-mc preamplifier.

Frequency selection is accomplished with either a tunable oscillator or a crystal-controlled oscillator as the source of the first local oscillator signal. Selection of the mode of operation, vfo or crystal-controlled, is made by a switch on the front panel of the tuning unit. The tuning mechanism is low-torque and virtually free of backlash.

The RTH-F18 is in the form of a complete plug-in module which may be installed in or removed from the receiver in a matter of seconds. All power and signal connections are made automatically by Blue-Ribbon and coaxial connectors, respectively, as the unit is inserted into the receiver main chassis; there are no cables to connect or disconnect when installing or removing the tuning unit.

1-2 ELECTRICAL AND PHYSICAL CHARACTERISTICS

The electrical and physical specifications for the RTH-F18 are given in table 1-1, and a transistor complement in table 1-2. A block diagram of the tuning unit is shown in figure 1-2.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS

Frequency Range	2200-2300 mc, continuously tunable or crystal-controlled.
RF Bandwidth	overall 3 db bandwidth is 1.1 mc ±10%.
Adjacent Channel Rejection	Output signal-to-noise ratio is degraded by less than 20 db due to presence of an adjacent channel signal (within the tuning range) having an input level of -10 dbm.
Intermediate Frequency	30 megacycles.
Local Oscillator Characteristics:	
Modes of Operation	a. continuously tunable; stability 0.001% per degree centigrade. b. crystal-controlled using CR-32A/U (in an oven); stability 0.001% per degree centigrade.
Input Impedance	operates from a 50 ohm source.
Noise Figure	11 db maximum.
Image Rejection	60 db minimum.
IF Rejection	80 db minimum.
Dimensions	4" x 7-1/2" x 13".

TABLE 1-2. TRANSISTOR COMPLEMENT

Chassis	Reference Designation	Type	Function
Main	Q1	2N3563	Variable Frequency Oscillator
	Q2	2N3563	Buffer Amplifier
	Q3	2N3478	Tripler
	Q4	2N3478	Tripler
	Q5	2N3478	Amplifier
	Q6 Q7	2N3563 2N3563	Crystal Oscillator
IF Preamplifier	Q1 Q2	2N3478 2N3478	Cascode Amplifier
	Q3 Q4	2N3478 2N3478	Cascode Amplifier
	Q5	2N3478	Buffer Amplifier

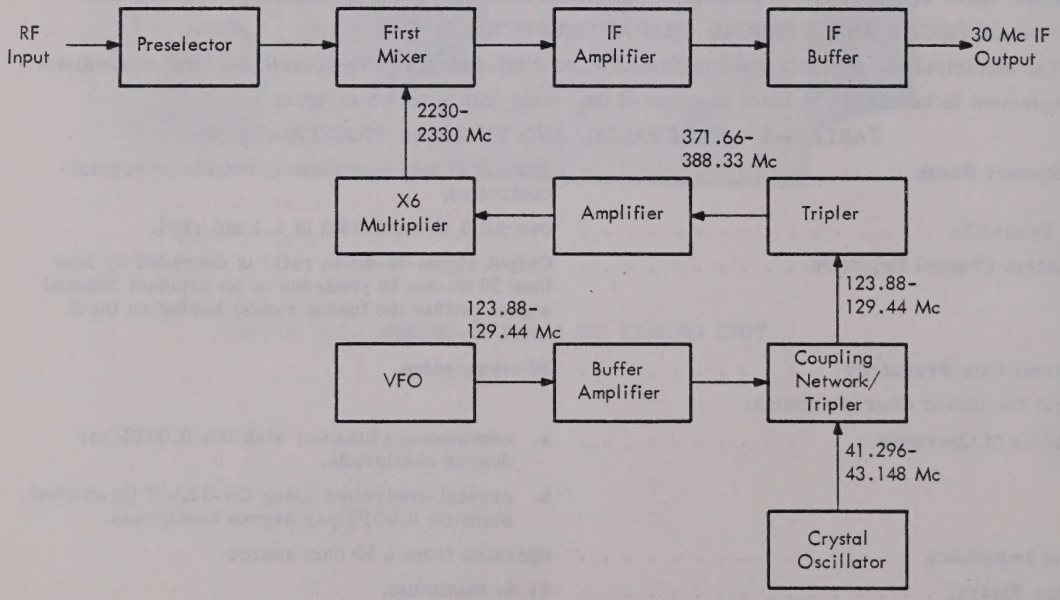

Figure 1-2. Model RTH-F18 RF Tuning Unit, Functional Block Diagram

SECTION II
THEORY OF OPERATION

2-1 GENERAL

The Model RTH-F18 RF Tuning Unit is designed for use with the Model TMR-18 Telemetry Receiver to meet the highest performance needs of specialized telemetry applications. The RTH-F18 is in the form of a complete plug-in module which may be removed from or installed in the TMR-18 receiver in a matter of seconds. All receiver "front-end" circuitry from the rf preselector to and including the i-f buffer is contained in the tuning unit which provides an output signal of 30 megacycles. A block diagram of the tuning unit is shown in figure 1-2.

2-2 CIRCUIT DESCRIPTION

References made to the schematic diagrams during the following discussion may prove helpful in gaining an understanding of the circuitry contained in the RTH-F18.

2-2.1 RF Preselector-First Mixer. The input rf signal is applied to an integral preselector-mixer unit, Z1, which is utilized to obtain maximum interference rejection and a low noise figure for the receiver's front end.

The preselector employs four coupled sections to obtain a maximally flat type response with a bandwidth of approximately 15 megacycles, giving greater than 60 db of attenuation to the image frequency. The mixer employs a strip-line coupler with a pair of matched diodes to suppress local oscillator noise, thereby obtaining the best possible noise figure. The local oscillator signal as fed to the mixer is 30 megacycles above the received frequency and results in a 30 megacycle output signal which is applied to the first i-f preamplifier, A1.

2-2.2 First Local Oscillator. The first local oscillators consist of a variable frequency oscillator (VFO) and a crystal-controlled oscillator (XTAL).

2-2.2.1 Variable Frequency Oscillator. The vfo, Q1, is a type 2N3563 transistor in a modified Colpitts arrangement. The vfo provides a signal that is one-eighteenth of the local oscillator injection signal applied to the first mixer. The tuning capacitor of the vfo is ganged through a gear drive to the preselector tuning shaft to obtain one-knob tuning over the entire tuning range. The output of Q1 is coupled to buffer amplifier Q2, a type 2N3563. Light coupling is used to improve oscillator stability. The output of Q2 is applied through the tuned circuit of Q3 to the second stage of the multiplier chain, Q4.

The vfo functions only when the l-o mode switch is in the VFO position.

2-2.2.2 Crystal Oscillator. Q6 and Q7, type 2N3563 transistors, constitute the broadband crystal oscillator. A type CR-52A/U or a type CR-32A/U (in an oven) is used as the frequency determining element. The oscillator operates at one fifty-fourth of the local oscillator injection frequency applied to the first mixer. The output of the crystal oscillator is applied to the first stage of the multiplier chain, Q3. The crystal oscillator functions only when the l-o mode switch is in the crystal position.

The formula for determining the crystal frequency is found in Section III of this manual.

2-2.3 Multiplier Chain. The multiplier chain provides a frequency multiplication of eighteen for the vfo and a frequency multiplication of fifty-four for the crystal oscillator.

In the crystal mode of operation, the injection signal generated by the crystal oscillator is applied to Q3, a type 2N3478, which functions as a tripler. The output of Q3 is applied to Q4, a type 2N3478, which also functions as a tripler. From Q4 the signal is applied to the amplifier stage Q5, a type 2N3478, which provides the necessary signal level to drive the diode multiplier, Z3. The tuned circuits of the multiplier chain are double-tuned with sufficient bandwidth to provide the required frequency multiplication of the oscillator signals throughout the frequency range.

The output of Q5 is applied to Z3 where the frequency is multiplied by a factor of six. Z3 is a step-recovery diode multiplier which utilizes a quadruple-tuned cavity in conjunction with a Hewlett-Packard Associated step-recovery diode type HPA0152. Z3 provides approximately four milliwatts of power at the local oscillator injection frequency. The output of Z3 is applied to the first mixer through a 6 db pad, Z2. The pad provides isolation between the mixer and the multiplier chain and attenuates the local oscillator injection signal to the required level of approximately one milliwatt.

In the vfo mode of operation the function of the multiplier chain is identical to the crystal mode of operation with the exception of the operation of Q3 and its associated circuitry. In the vfo mode, the output circuit of Q3 is used as a coupling network for the signal generated by the vfo, as the vfo signal is within the passband of this lc circuit.

2-2.4 30 Mc IF Preamplifier and IF Buffer, A1. The 30 mc low noise figure i-f preamplifier, A1, has two cascode stages using type 2N3478 transistors, Q1-Q2 and Q3-Q4. Q5, a type 2N3478, is the i-f buffer and provides the desired output impedance for interface purposes.

The low noise figure of less than 2 db is obtained by utilizing Q1 as a common emitter providing power gain into the low emitter-to-base impedance of Q2. Q2 is a grounded base stage whose output circuit is of the double-tuned slightly overcoupled type. The second cascode stage, Q3-Q4, is identical to the first.

The amplifier bandwidth is approximately 1.1 megacycles at the 3 db points, the selectivity being obtained from two double-tuned circuits following each cascode stage.

Automatic gain control voltage is applied to the amplifier through R2 to the base of Q1, and through R10 to the base of Q3. The agc voltage polarity is negative, causing a decrease in transistor beta and consequently a reduction in gain.

SECTION III
OPERATION

3-1 INTRODUCTION

A detailed operating procedure for a functioning TMR-18 receiver is given in the instruction manual for the Model TMR-18 Telemetry Receiver. For this reason only a brief description of the operating controls for the Model RTH-F18 RF Tuning Unit will be given in this instruction manual.

The tuning unit is designed for use with either a type MIL CR-52A/U or a type MIL CR-32A/U (in an oven) quartz crystal, should crystal-controlled first local oscillator operation be required. Provision has been made for front-panel mounting of the crystal and oven. Crystal frequency is determined by the following formula:

$$f_c = \frac{f_r + 30}{54}$$

where: f_c = crystal frequency

f_r = signal frequency

3-2 CONTROLS

There are two front panel controls and one indicator on the RTH-F18. The function of each is as follows:

a. TUNING. This control permits the operator to manually tune the rf preselector and the first local oscillator during vfo operation. The TUNING control also permits manual tuning of the rf preselector during crystal-controlled operation.

b. FIRST LO MODE. This switch enables the operator to select the mode of operation of the first local oscillator.

c. FREQUENCY (dial). The frequency dial indicates in megacycles the frequency to which the receiver is tuned.

Figure 3-1, a front panel view of RTH-F18, shows the location of the controls and indicator.

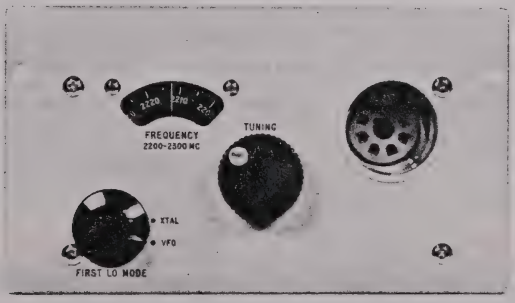

Figure 3-1. Model RTH-F18 RF Tuning Unit, Front View

SECTION IV
RANGE MAINTENANCE

4-1 INTRODUCTION

The Model RTH-F18 RF Tuning Unit is designed to give troublefree performance in the field with a minimum of routine maintenance. High quality components, conservatively rated, are used in the fabrication of the rf tuning unit with emphasis placed on operation well within ratings. During normal operation, no periodic calibration or realignment should be necessary. Unnecessary adjustments may degrade the performance of the rf tuning unit and therefore should be avoided. For these reasons, preventive maintenance is limited to the checks described in paragraph 4-2.

The preventive maintenance checks given should be performed at the recommended interval to prevent malfunctions and needless interruptions while the rf tuning unit is in service. When performing these checks, if a malfunction is detected, refer to Section V for service instructions. Periodic visual inspections should be made of the unit for evidence of corrosion, loose connections, burned wiring insulation, and loose, burned, or charred component parts. For installation procedures in replacing a component part, refer to paragraph 4-3.

A clean interior is necessary to ensure optimum performance by preventing corrosion and dirt from damaging parts or causing leakage between circuit points. Keeping the rf tuning unit relatively clean and dust-free, as well as in good mechanical condition is considered to be in keeping with good operating practices and is emphasized as a preventive maintenance procedure.

A primary requirement involving preventive maintenance of the rf tuning unit is the operator's thorough knowledge of the unit's operation, theory of operation, and preventive maintenance techniques.

The operator's understanding of any specified limitations and awareness of precautions applicable to the operation of the unit will thus maximize reliable unit performance and prolong its service time.

4-2 RECOMMENDED SCHEDULES

The recommended schedules consist of preventive maintenance checks to be performed in intervals of semiannual periods.

4-2.1 Semiannual Preventive Maintenance. The following checks, performed semiannually, will ensure reliable performance of the rf tuning unit.

4-2.1.1 Local Oscillator Frequency. For optimum performance of the rf tuning unit, the frequency of the local oscillator must be precisely 30 mc higher than the frequency to which the rf preselector is adjusted. The following procedure is intended to ascertain that this relationship exists.

Recommended Equipment:

Electronic Counter	HP 5245L
Converter Unit	HP 5253B
Test Cable	DEI B32253

a. Place the POWER switch on the front panel of the TMR-18 receiver to the OFF position. Remove the rf tuning unit from the TMR-18 receiver by loosening the four knurled thumbscrews and sliding the unit out of the receiver.

b. Connect the tuning unit test cable between P2 of the tuning unit and J3 of the receiver main chassis. Place the POWER switch to the ON position.

c. Place the FIRST LO MODE switch to the VFO position. Connect the counter converter input to J7 on the tuning unit. Set the tuning dial to 2200 mc, the counter should indicate a frequency of 371.667 (±20 kc) mc. Set the tuning dial to 2300 mc, the counter should indicate a frequency of 388.333 (±20 kc) mc.

4-2.1.2 AGC Level. The agc level applied to the i-f preamplifier should be -8 vdc when the input signal level applied to the tuning unit is at 50 mv. The agc voltage is adjusted by R23.

To check the tuning unit agc, proceed as follows:

NOTE

Before checking or making the agc level adjustment to the tuning unit, ascertain that agc adjustments external to the tuning unit have been made. Refer to the instruction manual for the Model TMR-18 Telemetry Receiver when performing this check.

Recommended Equipment:

Signal Generator	HP 8614
DC VTVM	HP 412A

a. Connect the tuning unit to the receiver as described in paragraph 4-2.1.1.

b. Connect the HP 412A to E3 on the i-f preamplifier. Connect the HP 8614 to the rf input, P1. Adjust the signal generator for an output level of 50 mv at 2250 mc.

c. The HP 412A should indicate a voltage level of -8 vdc. If this voltage is incorrect, adjust R23 for a -8 vdc indication on the HP 412A vtvm.

4-3 ASSEMBLY AND DISASSEMBLY

The rf tuning unit is assembled and disassembled in a reasonably straightforward manner and should pose no difficulty to servicing personnel. Component part removal and replacement may be accomplished by using straightforward disassembly techniques for parts accessible from the top and bottom of the unit. Replacement is accomplished by using straightforward assembly techniques which are usually the reverse of disassembly.

In the event of component replacement, the rf tuning unit may require alignment. In general, it will be necessary to align only the circuit or circuits associated with the stage in which repairs were made. Always allow at least 20 minutes of warmup time before attempting any alignment procedures.

Care should be exercised when removing or replacing components so as not to damage or disturb other components in the immediate area.

4-4 COMPONENT REPLACEMENT

Replacing a transistor is simply done by removing the defective one from its socket and inserting a new one.

When replacing other components, the following procedure should be applied:

a. Use a medium wattage solding iron. Heat the joint just long enough to melt the solder and remove the component. Care must be exercised so as not to disturb the placement of other components or burn any wiring.

b. When soldering is to be done to a transistor socket, remove the transistor so it will not be damaged by the heat.

c. When soldering is to be done on either side of a diode, connect heat sinks to the diode accordingly.

After replacing a component, other than a transistor, the affected section should be realigned according to the alignment procedures given in Section V of this manual.

SECTION V
BASE MAINTENANCE

5-1 MAJOR OVERHAUL

The Model RTH-F18 RF Tuning Unit has been carefully designed to give long and troublefree operation. Therefore, should repair become necessary, the corrective maintenance procedures presented in this section should be performed to eliminate the cause of the malfunction and to restore the unit to its original operating condition. For the reasons mentioned previously, it is probable that the need for internal repair will arise only very infrequently.

No specific overhaul procedures are required for this unit. However, each time the unit is serviced a visual inspection should be made of the unit's interior. A clean interior is necessary to ensure optimum performance by preventing corrosion and dirt from damaging parts or causing arc-over or leakage between circuit points. Blow out dust from the inside of the chassis. Be careful that air pressure is not great enough to damage parts or disturb wiring.

After cleaning, make visual inspection of parts and wiring for corrosion, loose connections, frayed and burned insulation, loose screws, and burned or charred resistors. Carefully inspect transistor sockets for broken contacts, and capacitors for leakage of oil or filling compound.

Lubrication of the potentiometers or gear train is not required and should be avoided since damage to the components could result.

Troubleshooting techniques should be based upon the performance of the equipment and upon a thorough knowledge of the theory of operation as contained in Section II of this instruction manual. The use of the schematic diagrams in Section VIII should facilitate servicing.

Frequently, visual inspection provides a clue to the source of the trouble by enabling location of damaged components, for an example, burned or discolored resistors or chokes, overheating or leaky capacitors.

5-2 SPECIAL COMPONENT FABRICATION AND REPAIR

The rf tuning unit has been designed so that repairs may be made conveniently to its component parts. These repairs may be accomplished by using the procedures outlined in paragraph 4-3. No specific component fabrication is required to make the necessary repairs. Figures 5-1 and 5-2 show the unit's top and bottom views.

5-3 PERFORMANCE REQUIREMENTS

The performance requirements for normal operation of the rf tuning unit are listed in table 1-1. Should performance of the unit deteriorate beyond the requirements specified in table 1-1, realignment may be necessary. To accomplish the realignment of the unit, refer to paragraph 5-6 for complete alignment procedures.

5-4 SPECIAL CORRECTIVE MAINTENANCE REQUIREMENTS

No special corrective maintenance requirements are required for the rf tuning unit.

5-5 INITIAL TEST SET-UP

Remove the tuning unit from the receiver main chassis. Install the tuning unit test cable, DEI B32253, between P2 of the tuning and J3 of the receiver main chassis. Set the switch on the test cable to the OFF position.

Initial Control Settings for the TMR-18 receiver main chassis:

a. Place the POWER switch to the OFF position.

b. Place the SECOND LO VERNIER TUNING KC control to zero indicated by a vertical ± line.

c. Place the STANDBY/OPERATE switch to the OPERATE position.

d. Place the AUDIO VOLUME control to the midrange position.

5-6 ALIGNMENT PROCEDURES

Allow 20 minutes of warmup time before attempting any alignment procedure.

5-6.1 Setup and Preliminary Checks.

a. Rotate the tuning knob to the maximum clockwise position, the index dot should appear beneath the curser.

b. Set L3, L5, C21, C24, C26, C30, and C32 to the maximum counterclockwise position.

c. Place the FIRST LO MODE switch to the VFO position. Remove the bottom cover. Set the tuning dial to 2250 mc. Index the vfo tuning capacitor to the center of its tuning range. Observe that the capacitor closes for a clockwise rotation of the tuning knob.

5-6.2 First IF Preamplifier.

Recommended Equipment:

Sweep Generator	Jerrold 900B
Oscilloscope	HP 130C
Signal Generator	HP 608D
50 to 200 Ohm Adaptor	DEI C32492
OSSM to BNC Adaptor	Omni-Spectra 31170

5-6.2.1 Procedure.

a. Set R23 to the maximum clockwise position. Disconnect P5 from the preselector. Connect the Jerrold 900B rf output to P5 using the 50 to 200 ohm alignment fixture and the OSSM to BNC adaptor.

b. Connect A1P2 to the Jerrold detector input. Connect the horizontal and vertical outputs of the Jerrold to the respective inputs on the oscilloscope. Connect the HP 608D signal generator to one of the marker inputs of the Jerrold.

c. Apply power to the receiver. Set the Jerrold to sweep around 30 mc with an output level of -30 dbm. Adjust L2, L3, L4, and L5 for a response centered between 29.5 and 30.5 mc. Adjust L3 and L5 for the proper "rocking" action and adjust L1 for a maximum response amplitude.

d. Remove the power and disconnect the Jerrold sweep generator.

5-6.3 Multiplier Chain Alignment.

Recommended Equipment:

Sweep Generator	Jerrold 900B
6 db Pad	Microlab AA-6N or equivalent
Oscilloscope	HP 130C
BNC to TNC Adaptor	Gremar 6051
Signal Generator	HP 608D

5-6.3.1 Preliminary Cavity Multiplier Alignment.

a. Disconnect P11 from J8 on the cavity multiplier and connect a Gremar type 6051 BNC to TNC adaptor to J8.

b. Connect the Jerrold rf output to the TNC adaptor, using RG-55A/U. Set the Jerrold for 0 dbm output at 380 mc on the UHF range. Set the sweep width close to maximum.

c. Connect the Jerrold external detector input (located on the rear apron) to either test point on the preselector-mixer (located under the i-f output jack.) Connect the HP 608D signal generator to one of the external marker inputs on the Jerrold and set it for a 380 mc marker. Set the Jerrold detector switch to the external position.

d. Adjust the tuning studs in the cavity multiplier to the maximum clockwise position. Turn each stud counterclockwise three turns. Check that C36, C37, and C38 are adjusted for minimum capacity (maximum counterclockwise).

e. Set the gain of the Jerrold dc amplifier to maximum and set the oscilloscope for 0.2 volts/cm, calibrated.

f. Carefully adjust the tuning studs for a quadruple-tuned response, approximately 16.0 mc wide, centered at 380 mc. Adjust C36, C37, and C38 for maximum amplitude and cleanest response.

g. Disconnect the Jerrold.

5-6.3.2 Solid-State Multiplier Alignment.

Recommended Equipment:

Sweep Generator	Jerrold 900B
6 db Pad	Microlab AA-6N or equivalent
Oscilloscope	HP 130C
Signal Generator	HP 608D
BNC to SM Adaptor	UG-690/U (2 required)

5-6.3.2.1 Procedure.

a. Replace the bottom cover. Turn FIRST LO MODE switch to the XTAL position. Set the Jerrold sweep generator to 42 mc on the VHF band. Turn the sweep generator preamplifier gain control to midrange. Connect the rf output of Jerrold to the internal detector. Set the rf output level to 0 db. (Set the attenuator to 0 db, zero the meter, push the blanking control, phase properly and adjust the rf output until the meter reads 0 db; pull the blanking knob out). Adjust the preamplifier gain control for an oscilloscope response of 2v with the oscilloscope set for a dc input.

b. Using a length of RG-223/U and a BNC to SM connector, connect the rf output of Jerrold to TP5. Connect the detector to TP2 using RG-223/U and a BNC to SM adaptor. Disconnect P11 from J8 on cavity multiplier and connect a 6 db pad to P11 using a TNC to BNC adaptor.

c. Apply power and adjust L19 and L20 for a response centered between 41.29 and 43.15 mc with an amplitude of 0.5v ±20% and centered at 42.2 mc. Adjust the sweep width for a 4 cm wide response.

d. Move the detector cable and adaptor to TP3. Adjust L3 and L5 for a response centered between 41.29 and 43.15 mc. The response amplitude should be 2.5v ±20%. C21 should be left at minimum capacity (maximum counterclockwise).

e. Move the detector cable and adaptor to TP4 and adjust C24 and C26 for a response centered between 41.29 and 43.15 mc. C21, L3, and L5 may be readjusted slightly to obtain maximum amplitude at this test point. The response amplitude at the center should be 5v ±20% and may be round-nosed or slightly overcoupled.

f. Move the detector cable and adaptor to the 6 db pad connected to P11 and adjust C36 and C32 for a response centered between 41.29 and 43.15 mc. The response amplitude at the center should be 7v ±20% and may be round-nosed or slightly overcoupled.

g. Reconnect P11 to J8 on cavity multiplier. Connect the external detector input probe on the Jerrold to either crystal test point on the preselector through a length of RG223 and clip leads. Set the detector switch on the Jerrold to the external position. Set the oscilloscope to the 1 volt/cm range. Adjust the Jerrold preamplifier gain control to maximum.

h. Carefully adjust the cavity tuning studs and matching network capacitors C36, C37, and C38 for a response centered between 41.29 and 43.15 mc. C36 and C37 should be adjusted for flatness and shape of the response and C38 for the cleanest response. Response amplitude should be 0.6v ±20%. Band limits should be less than 20% down from response center. It is permissible to readjust C24, C26, C30, and C32 slightly to obtain the desired response.

i. Move the Jerrold rf output cable and adaptor to TP1. Adjust L2 for response similar to that obtained in step h.

j. Remove the power and disconnect all test equipment from unit.

5-6.4 VFO Alignment.

Recommended Equipment:

Frequency Counter — HP 5245L and 5253A Converter

5-6.4.1 Procedure.

a. Set the FIRST LO MODE switch to the VFO position. Connect the counter to J7. Remove the bottom cover. Apply power to the unit. Set the tuning dial to 2200 mc and adjust C2 for a counted frequency of 371.667 mc ±20 kc.

b. Set the tuning dial to 2300 mc and check for a counted frequency of 388.333 mc ±20 kc. If the range is insufficient, adjust L1. For an increase in tuning range, the slug in L1 should be turned counterclockwise.

c. Repeat steps a and b until the proper frequency is achieved at both 2200 and 2300 mc.

d. Set the tuning dial to 2250 mc and check for a counted frequency of 380.000 mc ±20 kc. If the frequency is low at 2250 mc, note this reading and carefully bend the rotor plate away from the stator until a counted frequency is achieved of a magnitude above 380 mc that was previously below.

e. Repeat steps a, b, and c.

f. Repeat steps d and e until the proper counter readings, within ±20 kc, are achieved at 2200, 2250, and 2300 mc.

g. Replace bottom cover and repeat step f. Check the dial calibration every 10 mc and note that the count is within 300 kc of the proper count. (See chart below for correct count.)

Dial	1st LO output	Dial	1st LO output
2200	371.667	2260	381.667
2210	373.333	2270	383.666
2220	375.000	2280	385.000
2230	376.667	2290	386.667
2240	378.333	2300	388.333
2250	380.000		

5-6.5 Noise Figure Check.

Recommended Equipment:

Noise Figure Meter	HP 340B
Noise Source	HP 349A
Frequency Counter	HP 5245L and 5253A Converter
Noise Figure Amplifier	DEI LM22503
RF Millivoltmeter	HP 411A
Power Supply	HP 721A or equivalent
Crystals type CR-52A/U	A-41.29629 mc B-42.22222 mc C-43.14814 mc

5-6.5.1 Procedure.

a. Connect the HP 349A noise source to J1. Set the AGC switch to the OFF position. Connect A1P2 to the DEI noise figure amplifier LM22503 and connect the amplifier output to the HP 340B noise figure meter 30 mc input.

b. Set the tuning dial for 2250 mc. Disengage the flexible union between the tuning shaft and the preselector-mixer. Rotate the preselector shaft to its counterclockwise stop and then slowly clockwise until a noise figure of less than 11 db is attained. Rotate the tuning knob slowly, first clockwise and then counterclockwise until the noise figure reading begins to rise sharply. Once both ends of the response are found, locate the center of the response and lock the flexible union set screws to the shaft.

c. Tune the tuning unit over the entire range and check to see that the noise figure remains below 11 db across the entire tuning range. If this noise figure is not 11 db or less over the entire range, the flexible union and/or the multiplier alignment should be carefully checked and realigned if necessary to obtain the desired noise figure.

d. Check the noise figure for XTAL operation at 2200, 2250, and 2300 mc.

e. Remove the power and disconnect the test equipment.

5-6.6 Gain Standardization.

Recommended Equipment:

Signal Generator	HP 8614A
RF Millivoltmeter	HP 411A with 50 ohm "T"
VTVM	HP 412A
Power Supply	HP 721A

5-6.6.1 Procedure.

a. Connect the HP 8614A signal generator to the antenna input of the tuning unit. Place the switch on the tuning unit test cable to the ON position. Apply power to the unit.

b. Set the HP 8614A to 2250 mc with an output level of 1 millivolt. Tune the receiver to the signal generator.

c. Disconnect A1P2 from the first i-f preamplifier and connect it to the HP 411A. Set the switch on the test cable to the OFF position.

d. Connect the HP 721A power supply between E5 and ground. Connect the HP 412A across the power supply and set the output to -1v dc.

e. Adjust R23 for maximum output.

f. Adjust the attenuator on the HP 8614A to produce a -20 dbm indication on the HP 411A. The attenuation required to produce this indication should be between 55 and 61 db.

g. Set the output of the power supply to -8 vdc as indicated by the HP 412A.

h. Set the output level of the HP 8614A to 0 dbm (ensure that the signal generator is still tuned to 2250 mc). Adjust R23 for a 50 mv output as indicated by the HP 411A.

i. Remove the power and disconnect the test equipment.

5-6.7 Image Rejection.

Recommended Equipment:

Signal Generator	HP 8614A

5-6.7.1 Procedure.

a. Reconnect A1P2 to the first i-f preamplifier. Replace the top cover and install the tuning unit into the receiver main chassis. Set the tuning unit dial to 2300 mc.

b. Connect the HP 8614A signal generator to the antenna input jack on the rear apron. Tune the signal generator to the receiver with an output level of -90 dbm.

c. Set the AGC switch on the rear apron to the OFF position and adjust R11 on the main chassis for a convenient reading on the signal level meter, approximately one-half scale.

d. Tune the signal generator to 2360 mc and increase the attenuator to produce the same meter reading, as in step c, and note the new attenuator setting, it should be between 0 and -30 dbm.

5-6.8 IF Rejection.

Recommended Equipment:

Signal Generator	HP 8614A
Signal Generator	HP 608D

5-6.8.1 Procedure.

a. Set the tuning unit dial to 2250 mc. Connect the HP 8614A signal generator to the antenna input jack on the rear apron. Tune the signal generator to the receiver with an output level of -90 dbm.

b. Set the AGC switch on the rear apron to the OFF position and adjust R11 located on the main chassis for a convenient signal level meter reading, approximately one-half scale.

c. Disconnect the HP 8614A signal generator and connect the HP 608D to the antenna input.

d. Set the HP 608D to 30 mc and adjust the attenuator for the same signal level meter indication as in step b. Subtract this attenuator reading from -90 dbm, there should be a minimum of 80 dbm difference.

e. Remove the power and disconnect the test equipment; the alignment is complete.

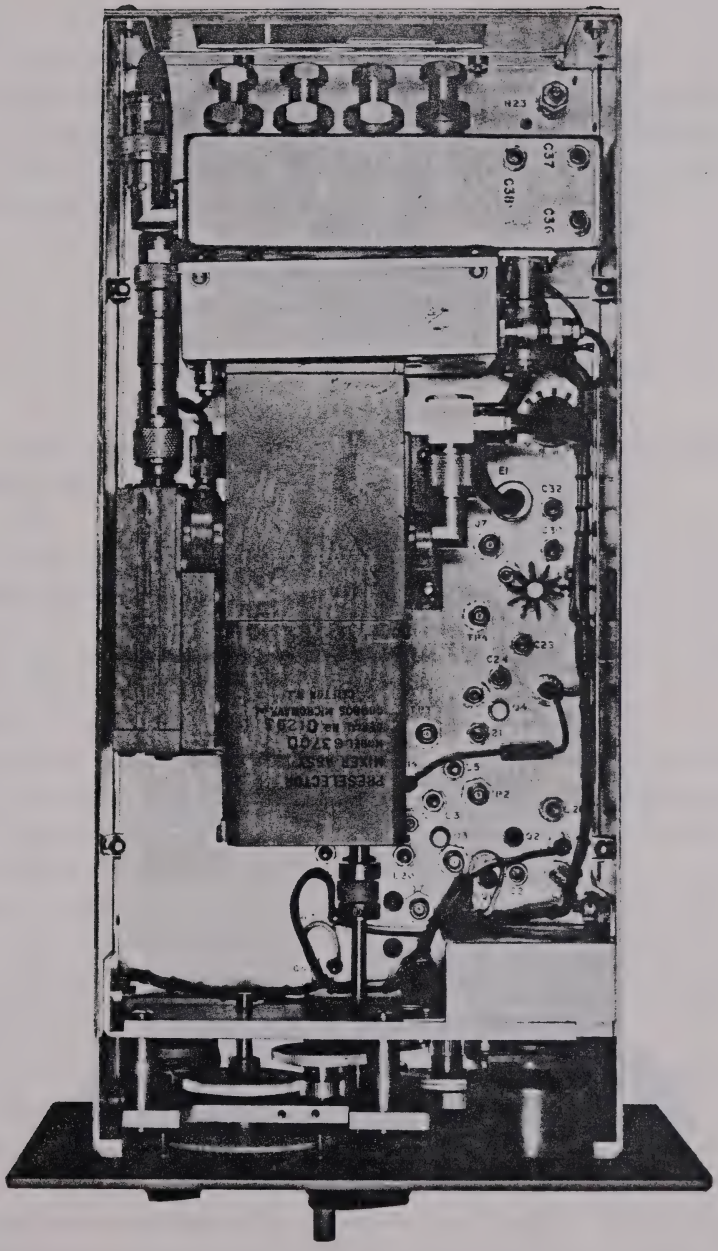

Figure 5-1. Model RTH-F18 RF Tuning Unit, Top View

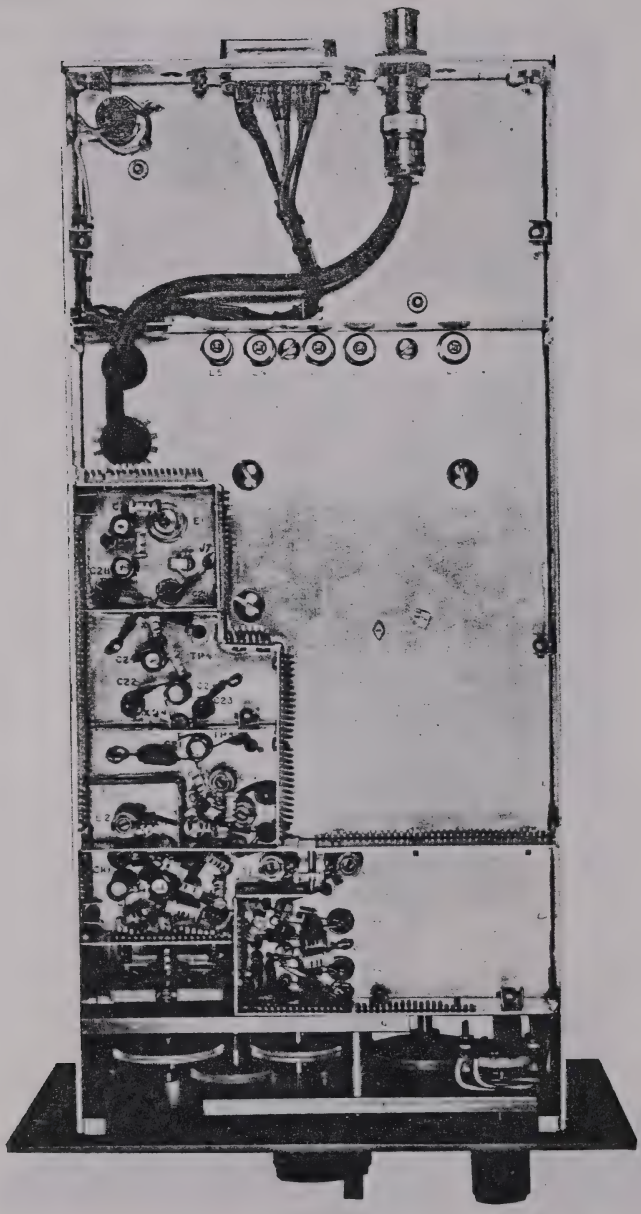

Figure 5-2. Model RTH-F18 RF Tuning Unit, Bottom View with Cover Removed

SECTION VI
INSTALLATION

6-1 RECEIPT AND UNPACKING

Upon receipt of the Model RTH-F18 RF Tuning Unit, it should be unpacked and inspected for in-transit damage. When unpacking the unit, carefully open the outer packing material and lift out the inner package. Unwrap the inner package, ensuring that no hard or sharp tools touch the unit. Remove the unit from the inner package and place it in an upright position.

NOTE

The shipping containers are designed specifically to protect the unit from damage during normal handling. Any damage to the unit is an indication of improper handling. If there is any damage, notify the proper authority immediately.

The empty shipping material should be retained to be used in the event that the unit is to be stored or shipped at some later date.

6-2 INSPECTION

Inspect the chassis for security of components and loose or disconnected wiring. Inspect the interior for damage to connectors and component parts. If the unit is not to be installed within a short period of time after it is received, it should be unpacked and inspected, then repacked and stored in an upright position. The environment of the storage area should be similar to that in which the unit will eventually be employed. (Refer to paragraph 6-4 for storage instructions.)

6-3 MOUNTING

The rf tuning unit is in the form of a plug-in module. All electrical connections are made automatically through a Blue Ribbon and a coaxial connector as the unit is inserted into the main chassis of the Model TMR-18 Telemetry Receiver. There are no cables to be manually connected during installation, or disconnected during removal.

To install the rf tuning unit, insert it through the opening at the lower right-hand side of the receiver's front panel. Carefully push the unit into the receiver until the connectors mate with each other. Some resistance will be noticed as the tuning unit's front panel nears the receiver's front panel; this is due to the mating of the connectors. Tighten the four knurled thumbscrews until the unit is securely mounted in the receiver.

To remove the rf tuning unit, unscrew the four thumbscrews and carefully withdraw the tuning unit from the main chassis of the receiver.

6-4 STORAGE

In the event the tuning unit is to be stored for a prolonged period of time, place the unit in its original shipping container, paragraph 6-1, or equivalent. Repack the original shipping container. Store the packed carton in a dry area similar to the environment in which the unit will eventually be employed, so that the unit does not encounter weather effects which may cause corrosion.

6-5 PHYSICAL CHARACTERISTICS

The Model RTH-F18 RF Tuning Unit weighs approximately 14 pounds and occupies 4 inches of height and 7-1/2 inches of width of the Model TMR-18 Telemetry Receiver front panel. The rf tuning unit is mounted in the receiver's main chassis and is secured to the receiver's front panel with four knurled thumbscrews as mentioned in paragraph 6-3.

When installing the tuning unit in the TMR-18 receiver, be certain that there is no appreciable resistance while inserting the unit into the receiver to avoid damaging the plug-in type connector.

6-6 SPECIAL MOUNTING REQUIREMENTS

There are no special mounting requirements to be adhered to when installing the tuning unit in the receiver. When installing the tuning unit into the receiver main chassis, ensure that it is properly inserted as any misalignment may cause damage to the connectors during the installation process.

SECTION VII
ELECTRICAL PARTS LIST

7-1 INTRODUCTION

The electrical parts listed in this section reference those shown on schematic diagrams in Section VIII. Each part is listed alphanumerically by its reference designation; the letter identifies the type of part, for an example, C for capacitor, R for resistor, and L for inductor.

When ordering replacement parts, include the model and serial numbers of the unit, the reference symbol designation and the complete nomenclature of the part as given in the parts list.

MAIN CHASSIS

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
C1	Capacitor, modified, DEI B19550		$81.24	1
C2	Capacitor, variable, glass, tubular, 0.8-8.5 uuf, JFD VC20GYCE		11.70	2
C3	Capacitor, ceramic, tubular, 4.3 uuf ±0.25 uuf, Erie NPO-A		.44*46	
C4	Capacitor, ceramic, tubular, 5.6 uuf ±0.25 uuf, Erie NPO-A		.60*34	
C5	Capacitor, ceramic, tubular, 47 uuf ±5%, Erie NPO-T		.56*36	
C6	Capacitor, ceramic, tubular, 15 uuf ±5%, Erie NPO-A		.44*46	
C7	Capacitor, ceramic, feed-thru, 0.001 uf, +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C8	Capacitor, ceramic, tubular, 15 uuf ±5%, Erie NPO-A		.44*46	
C9	Capacitor, ceramic, tubular, 3.9 uuf ±0.1 uuf, Erie NPO-A		.44*46	
C10	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C11	Capacitor, ceramic, disc, 0.001 uf +100-20%, Erie CK61Y102Z	5910-666-7156	.76*27	
C12	Capacitor, ceramic, tubular, 24 uuf ±5%, Erie NPO-A		.44*46	
C13	Capacitor, ceramic, tubular, 2.2 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C14	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C15	Capacitor, ceramic, tubular, 1.6 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C16	Capacitor, ceramic, tubular, 3 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C17	Capacitor, ceramic, stand-off, 0.001 uf +100-0%, Allen Bradley SS5A-102W		1.04*20	

* See page 7-10.

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
C18	Capacitor, ceramic, tubular, 22 uuf ±5%, Erie NPO-A		$ .44*46	
C19	Capacitor, ceramic, tubular, 3.6 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C20	Capacitor, ceramic, disc, 100 uuf ±10%, Erie HR-839-X5F		2.04*10	
C21	Capacitor, variable, glass, tubular 0.8-8.5 uuf, JFD VC20GYCE		11.70	
C22	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C23	Capacitor, ceramic, stand-off, 0.001 uf +100-0%, Allen Bradley SS5A-102W		1.04*20	
C24	Capacitor, variable, glass, tubular, 0.8-8.5 uuf, JFD VC20GYCE		11.70	
C25	Capacitor, ceramic, tubular, 1.8 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C26	Capacitor, variable, glass, tubular, 0.8-8.5 uuf, JFD VC20GYCE		11.70	
C27	Capacitor, ceramic, tubular, 3.3 uuf ±0.1 uuf, Erie NPO-A		.44*46	
C28	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C29	Capacitor, ceramic, stand-off, 0.001 uf +100-0%, Allen Bradley SS5A-102W		1.04*20	
C30	Capacitor, variable, glass, tubular, 0.8-8.5 uuf, JFD VC20GYCE		11.70	
C31	Capacitor, ceramic, tubular, 2 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C32	Capacitor, variable, glass, tubular, 0.8-8.5 uuf, JFD VC20GYCE		11.70	
C33	Capacitor, ceramic, tubular, 3 uuf ±0.1 uuf, Erie NPO-A		1.12*18	
C34	Capacitor, ceramic, tubular, 6.8 uuf ±0.25 uuf, Erie NPO-A	5910-681-9289	.88*23	
C35	Capacitor, ceramic, tubular, 18 uuf ±5%, Erie NPO-A		.44*46	
C36	Capacitor, variable, glass, tubular, 0.7-12 uuf, JFD VC22GYCE		12.75	1
C37	Capacitor, variable, glass, tubular, 0.7-12 uuf, JFD VC22GYCE		12.75	
C38	Capacitor, variable, glass, tubular, 0.8-4.5 uuf, JFD VC21GYCE	5910-723-4529	11.10	1
C39	Capacitor, ceramic, tubular, 4.7 uuf ±0.25 uuf, Erie NPO-A	5910-842-0885	.44*46	

*See page 7-10.

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
C40	Capacitor, ceramic, disc, 0.001 uf +100-20%, Erie CK61Y102Z	5910-666-7156	$ .76*27	
C41	Capacitor, ceramic, tubular, 47 uuf ±5%, Erie NPO-T		.56*36	
C42	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C43	Capacitor, ceramic, disc, 0.001 uf ±10%, Erie HR-809-X5T		2.04*10	
C44	Capacitor, ceramic, tubular, 20 uuf ±5%, Erie NPO-A		.44*46	
C45	Capacitor, ceramic, disc, 0.001 uf, +100-20%, Erie CK61Y102Z	5910-666-7156	.76*27	
C46	Capacitor, ceramic, tubular, 6.2 uuf, ±0.25 uuf, Erie NPO-A		.96*21	
C47	Capacitor, ceramic, feed-thru, 0.001 uf +100-0%, Allen Bradley FA5C-102W	5910-802-7432	1.04*20	
C48	Capacitor, ceramic, disc, 0.001 uf +100-20%, Erie CK61Y102Z	5910-666-7156	.76*27	
C49	Capacitor, ceramic, tubular, 18 uuf ±5%, Erie NPO-A		.56*36	
C50	Capacitor, ceramic, tubular, 8.2 uuf ±0.25 uuf, Erie NPO-A		.96*21	
C51	Capacitor, ceramic, tubular, 30 uuf ±5%, Erie NPO-T		.44*46	
C52	Capacitor, ceramic, tubular, 5.6 uuf ±0.25 uuf, Erie NPO-A		.60*34	
C53	Capacitor, 5.1 uuf ±5%, Corning CY10C5R1C	5910-823-1512	10.89	
C54	Capacitor, ceramic, disc, 0.001 uf +100-20%, Erie CK61Y102Z	5910-666-7156	.76*27	
CR1	Diode, step recovery, HP Associates HPA0152		45.00	
E1	Termination, coaxial cable, Integral part of W5, Dage 95712			
E2 through E5	Terminal, Teflon subminiature, stand-off push-in, Sealectro ST-SM-1	5940-502-3726	.40	
FT1	Terminal, Teflon subminiature, feed-thru push-in, Sealectro FT-SM-1		.40	
J1	Receptacle, integral part of Z1			

* See page 7-10.

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
J2	Receptacle, integral part of Z1		$	
J3	Receptacle, integral part of Z2			
J4	Receptacle, integral part of Z1			
J5	Not assigned			
J6	Not assigned			
J7	Receptacle, type SM, UG-697/U		3.80	
J8	Receptacle, flange mount, integral part of Z3, Automatic Metal Prod. 15T3000			
J9	Receptacle, flange mount, integral part of Z3, Automatic Metal Prod. 15T3000			
J10	Socket, octal, Elco TS101P01	5935-260-0517	1.40	
L1	Inductor, adjustable, glass, LRC Elect. Inc. 681209		13.95	1
L2	Inductor, adjustable, DEI A31949		29.75	1
L3	Inductor, adjustable, DEI A31950		29.75	1
L4	Inductor, fixed, DEI A31951		29.75	1
L5	Inductor, adjustable, DEI A31952		29.75	1
L6	Inductor, fixed, DEI A10280		29.75	1
L7	Inductor, fixed, DEI A31953		29.75	1
L8	Inductor, fixed, DEI B32095		29.75	1
L9	Inductor, fixed, DEI A31954		29.75	1
L10	Inductor, fixed, DEI A31954		29.75	1
L11	Inductor, fixed, DEI B31961		8.50	1
L12	Inductor, fixed, DEI A31954		29.75	1
L13	Inductor, fixed, DEI B31967		17.50	1
L14	Inductor, fixed, DEI B31963		17.50	1
L15	Inductor, fixed, DEI A31955		29.75	1
L16	Inductor, fixed, DEI A31956		29.75	1
L17	Inductor, fixed, DEI B10270		29.75	1
L18	Not assigned			
L19	Inductor, adjustable, DEI A31958		29.75	1
L20	Inductor, adjustable, DEI A31958		29.75	1
L21	Inductor, fixed, DEI B32391		8.50	1
P1	Plug, push on to BNC, Dage 30584-1		6.12	
P2	Plug, TNC, integral part of W1			
P3	Plug, TNC, integral part of Z2			
P4	Plug, TNC, integral part of W6			

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
P5	Plug, OSSM, integral part of W2, Part of A1		$	
P6	Not assigned			
P7	Plug, SM, integral part of W3			
P8	Plug, integral part of W1			
P9	Not assigned			
P10	Not assigned			
P11	Plug, integral part of W5			
P12	Plug, integral part of W6			
P13	Plug, miniature, 24 contact, Amphenol 57-10240	5935-553-2565	7.11	
Q1	Transistor, silicon, npn, Fairchild 2N3563		4.80	2
Q2	Transistor, silicon, npn, Fairchild 2N3563		4.80	
Q3	Transistor, silicon, npn, RCA 2N3478		6.18	1
Q4	Transistor, silicon, npn, RCA 2N3478		6.18	
Q5	Transistor, silicon, npn, RCA 2N3478		6.18	
Q6	Transistor, silicon, npn, Fairchild 2N3563		4.80	
Q7	Transistor, silicon, npn, Fairchild 2N3563		4.80	
R1	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R2	Resistor, fixed composition, 1k ±5%, 1/4w Allen Bradley CB1025	5905-577-9495	.29	
R3	Resistor, fixed composition, 510Ω ±5%, 1/4w Allen Bradley CB5115	5905-577-9484	.29	
R4	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R5	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R6	Resistor, fixed composition, 1k ±5%, 1/4w Allen Bradley CB1025	5905-577-9495	.29	
R7	Resistor, fixed composition, 1.1k ±5%, 1/4w Allen Bradley CB1125		.29	
R8	Resistor, fixed composition, 220Ω ±5%, 1/4w Allen Bradley CB2215	5905-577-9480	.29	
R9	Resistor, fixed composition, 100Ω ±5%, 1/4w Allen Bradley CB1015	5905-577-9497	.29	

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
R10	Resistor, fixed composition, 4.7k ±5%, 1/4w Allen Bradley CB4725	5905-577-9483	$ .29	
R11	Resistor, fixed composition, 1k ±5%, 1/4w Allen Bradley CB1025	5905-577-9495	.29	
R12	Resistor, fixed composition, 100Ω ±5%, 1/4w Allen Bradley CB1015	5905-577-9497	.29	
R13	Resistor, fixed composition, 27Ω ±5%, 1/4w Allen Bradley CB2705		.29	
R14	Resistor, fixed composition, 10k ±5%, 1/4w Allen Bradley CB1035	5905-577-9465	.29	
R15	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R16	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R17	Resistor, fixed composition, 1.2k ±5%, 1/4w Allen Bradley CB1225		.29	
R18	Resistor, fixed composition, 24Ω ±5%, 1/4w Allen Bradley CB2405		.29	
R19	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R20	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R21	Resistor, fixed composition, 2k ±5%, 1/4w Allen Bradley CB2025		.29	
R22	Resistor, fixed composition, 47Ω ±5%, 1/4w Allen Bradley CB4705	5905-577-9945	.29	
R23	Resistor, potentiometer, 10k ±5%, 1/4w Allen Bradley RV6LAYSA252A	5905-552-5490	6.21	1
R24	Resistor, fixed composition, 47Ω ±5%, 1/4w Allen Bradley CB4705	5905-577-9945	.29	
R25	Resistor, fixed composition, 3.9k ±5%, 1/4w Allen Bradley CB3925	5905-577-9459	.29	
R26	Resistor, fixed composition, 240Ω ±5%, 1/4w Allen Bradley CB2415		.29	
S1	Switch, modified DEI B33966		85.72	1
TP1 through TP5	Receptacle, SM, UG697/U	5935-549-2821	3.80	
W1	Cable, coaxial, DEI B33963		31.00	1
W2	Cable, coaxial, integral part of A1			
W3	Cable, coaxial, DEI B33964		19.80	1
W4	Not assigned			

MAIN CHASSIS, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
W5	Cable, coaxial, multiplier output, DEI B31934		$26.72	1
W6	Cable, coaxial, cavity output, DEI B31935		26.00	1
XQ1	Socket, transistor, Augat 8060-1G7		3.00	
XQ2	Socket, transistor, Augat 8060-1G7		3.00	
XQ3 through XQ5	Socket, transistor, Augat 8060-1G8		3.00	
XQ6	Socket, transistor, Augat 8060-1G7		3.00	
XQ7	Socket, transistor, Augat 8060-1G7		3.00	
Z1	Preselector mixer, DEI D19473		2100.00	1
Z2	Attenuator, fixed, 6 db, Emco A-106T		22.50	1
Z3	Cavity, multiplier, DEI C22474-1		718.92	1

IF PREAMPLIFIER, A1

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
C1	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		$ 1.20	
C2	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C3	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C4	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C5	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C6	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C7	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C8	Capacitor, ceramic, tubular, 15 uuf ±5% Erie 301-000		.44*46	
C9	Capacitor, ceramic, tubular, 0.51 uuf ±0.25%, Erie 301-000		.44*46	
C10	Capacitor, ceramic, tubular, 20 uuf ±5% Erie 301-000		.44*46	
C11	Capacitor, mica molded, 240 uuf, ±5% Arco CM15E241J	5910-265-5766	1.08	
C12	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C13	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C14	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C15	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C16	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C17	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C18	Capacitor, ceramic, tubular, 0.15 uuf ±5% Erie 301-000		.44*46	
C19	Capacitor, ceramic, tubular, 0.51 uuf ±0.25 uuf, Erie 301-000		.44*46	
C20	Capacitor, ceramic, tubular, 0.25 uuf ±5% Erie 301-000		1.12*18	
C21	Capacitor, mica molded, 300 uuf ±5% Arco CM15E301J	5910-666-7700	1.20	
C22	Capacitor, ceramic, disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	

*See page 7-10.

IF PREAMPLIFIER, A1, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
C23	Capacitor, ceramic,disc, 0.005 uf 150 vdc, Centralab DDM-502		$ 1.20	
C24	Capacitor, ceramic,disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C25	Capacitor, ceramic,disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C26	Capacitor, ceramic,disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
C27	Capacitor, ceramic,disc, 0.005 uf 150 vdc, Centralab DDM-502		1.20	
E1	Feed-thru, Teflon, Cambion 4179-1-0519		.56	
E2	Feed-thru, Teflon, Cambion 4179-1-0519		.56	
E3	Feed-thru, Teflon, Cambion 4179-1-0519		.56	
E4	Termination, coaxial cable, integral part of W2			
J1	Jack, rf, bulkhead mount, UG697/U	5935-549-2821	3.80	
L1 through L5	Inductor, variable, 0.9-1.75 uh, Cambion 1505-2		7.20	1
P5	Plug, OSSM, integral part of W2			
Q1 through Q5	Transistor, silicon, RCA 2N3478		6.18	1
R1	Resistor, fixed composition, 3.6k, ±5% 1/4w Allen Bradley CB3625		.29	
R2	Resistor, fixed composition, 24k ±5%, 1/4w Allen Bradley CB2435	5905-721-0597	.29	
R3	Resistor, fixed composition, 10k ±5%, 1/4w Allen Bradley CB1035	5905-577-9465	.29	
R4	Resistor, fixed composition, 2.2k ±5%, 1/4w Allen Bradley CB2225	5905-723-5251	.29	
R5	Resistor, fixed composition, 24k ±5%, 1/4w Allen Bradley CB2435		.29	
R6	Resistor, fixed composition, 5.6k ±5%, 1/4w Allen Bradley CB5625	5905-577-9683	.29	
R7	Resistor, fixed composition, 51Ω ±5%, 1/4w Allen Bradley CB5105		.29	

IF PREAMPLIFIER, A1, cont'd

Reference Designation	Description	Federal Stock No.	Est. Unit Cost	Recm'd Spares
R8	Resistor, fixed composition, 3.0k ±5%, 1/4w, Allen Bradley CB 3025		$	
R9	Resistor, fixed composition, 13k ±5%, 1/4w, Allen Bradley CB 1335	5905-807-6857	.29	
R10	Resistor, fixed composition, 24k ±5%, 1/4w, Allen Bradley CB 2435		.29	
R11	Resistor, fixed composition, 10k ±5%, 1/4w, Allen Bradley CB 1035		.29	
R12	Resistor, fixed composition, 2.2k ±5%, 1/4w, Allen Bradley CB 2225		.29	
R13	Resistor, fixed composition, 24k ±5%, 1/4w, Allen Bradley CB 2435		.29	
R14	Resistor, fixed composition, 3.6k ±5%, 1/4w, Allen Bradley CB 3625		.29	
R15	Resistor, fixed composition, 5.6k ±5%, 1/4w, Allen Bradley CB 5625		.29	
R16	Resistor, fixed composition, 51Ω ±5%, 1/4w, Allen Bradley CB 5105		.29	
R17	Resistor, fixed composition, 3.6k ±5%, 1/4w, Allen Bradley CB 3625		.29	
R18	Resistor, fixed composition, 13k ±5%, 1/4w, Allen Bradley CB 1335		.29	
R19	Resistor, fixed composition, 5.1k ±5%, 1/4w, Allen Bradley CB 5125		.29	
R20	Resistor, fixed composition, 51Ω ±5%, 1/4w, Allen Bradley CB 5105		.29	
R21	Resistor, fixed composition, 24Ω ±5%, 1/4w, Allen Bradley CB 2405	5905-577-9485	.29	
R22	Resistor, fixed composition, 10k ±5%, 1/4w, Allen Bradley CB 1035		.29	
R23	Resistor, fixed composition, 620Ω ±5%, 1/2w, Allen Bradley EB 6215	5905-807-7506	.24	
R24 through R29	Resistor, fixed composition, 100Ω ±5%, 1/4w, Allen Bradley CB 1015	5905-577-9497	.29	
W1	Not assigned			
W2	Cable assembly, DEI B32368		43.14	1

NOTE: The asterisk and number included in the estimated unit cost column denotes minimum buy requirements. For example, $.76*18 indicates a minimum buy of 18 units at $.76 each.

SECTION VIII
SCHEMATIC DIAGRAMS

8-1 INTRODUCTION

This section contains the schematic diagrams of the Model RTH-F18 RF Tuning Unit. The schematic diagrams provided in this section will be useful in gaining an understanding of the functional description presented in Section II, and as an aid in the maintenance, alignment, and operation of the rf tuning unit.

The component parts of the rf tuning unit, shown by symbols and referred to by reference designations, on the schematic diagram, are listed in Section VII as repair parts.

No waveforms are included on the schematic diagram because the characteristics of a waveform at a specific test point depends on the characteristics of the signal being received at that particular interval of time. Therefore to present a waveform at a test point leads to unnecessary confusion and does not facilitate the maintenance of the rf tuning unit.

Unless otherwise noted the following information applies to the schematic diagrams.

a. Capacitor values less than one are in microfarads.
b. Capacitor values greater than one are in picofarads (micromicrofarads).
c. Inductance values are in microhenrys.
d. Resistor values are in ohms, K=1000, M-1, 000, 000.
e. ⊘ Internal adjustment.
f. ⇶ Arrow denotes clockwise rotation.
g. ○ Operating control.
h. Partial reference designations are shown; for complete identification prefix with the unit number or subassembly designation.
i. * Typical value.

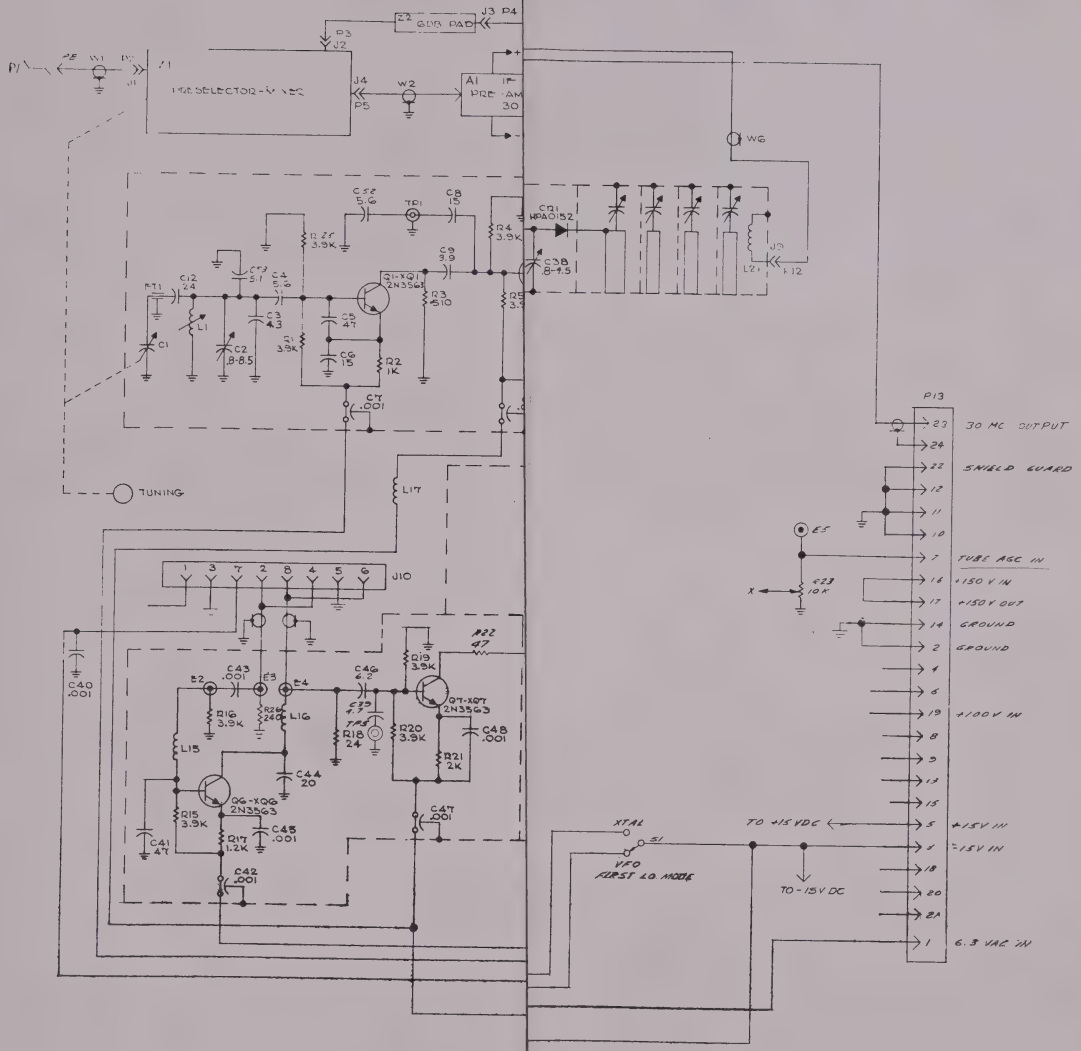

Figure 8-1. Model RTH-F18 RF Tuning Unit Schematic Diagram R33891

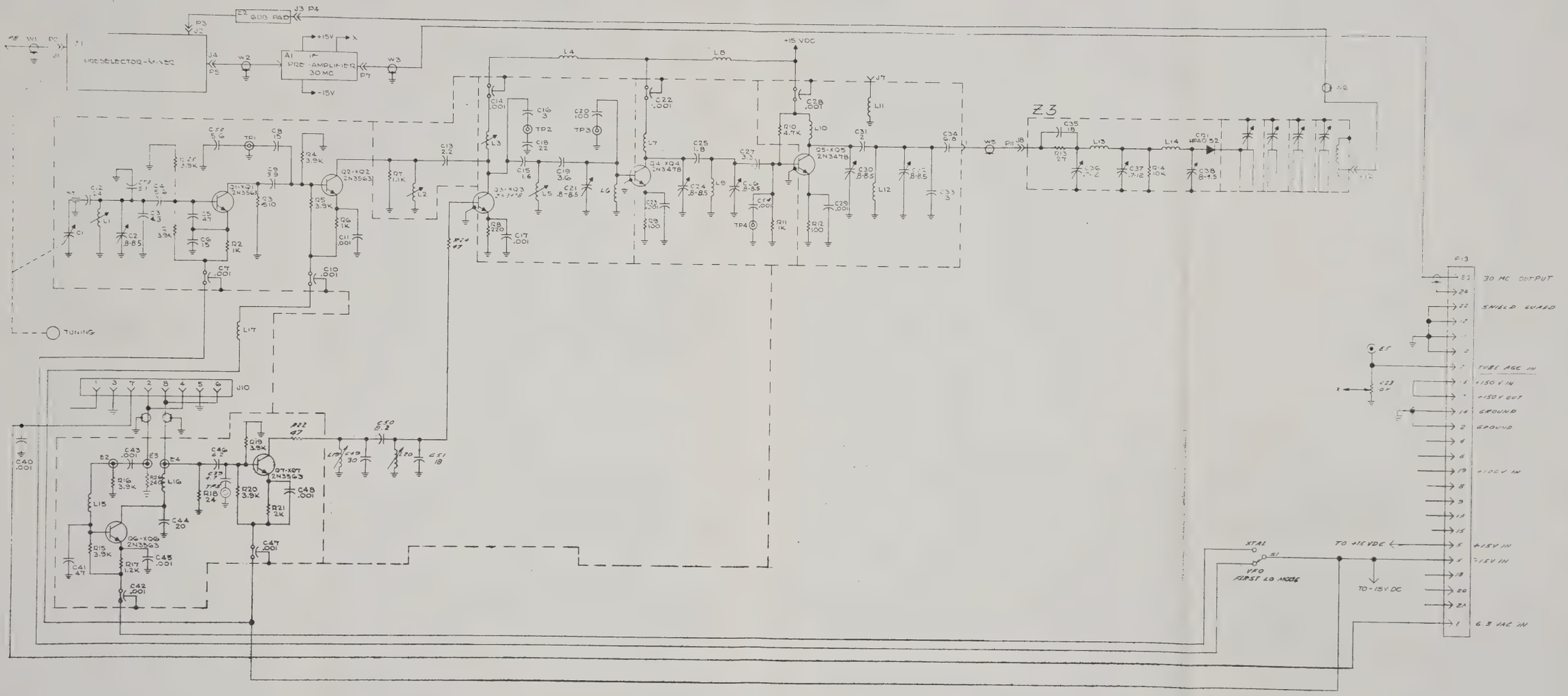

Figure 8-1. Model RTH-F18 RF Tuning Unit Schematic Diagram R33891

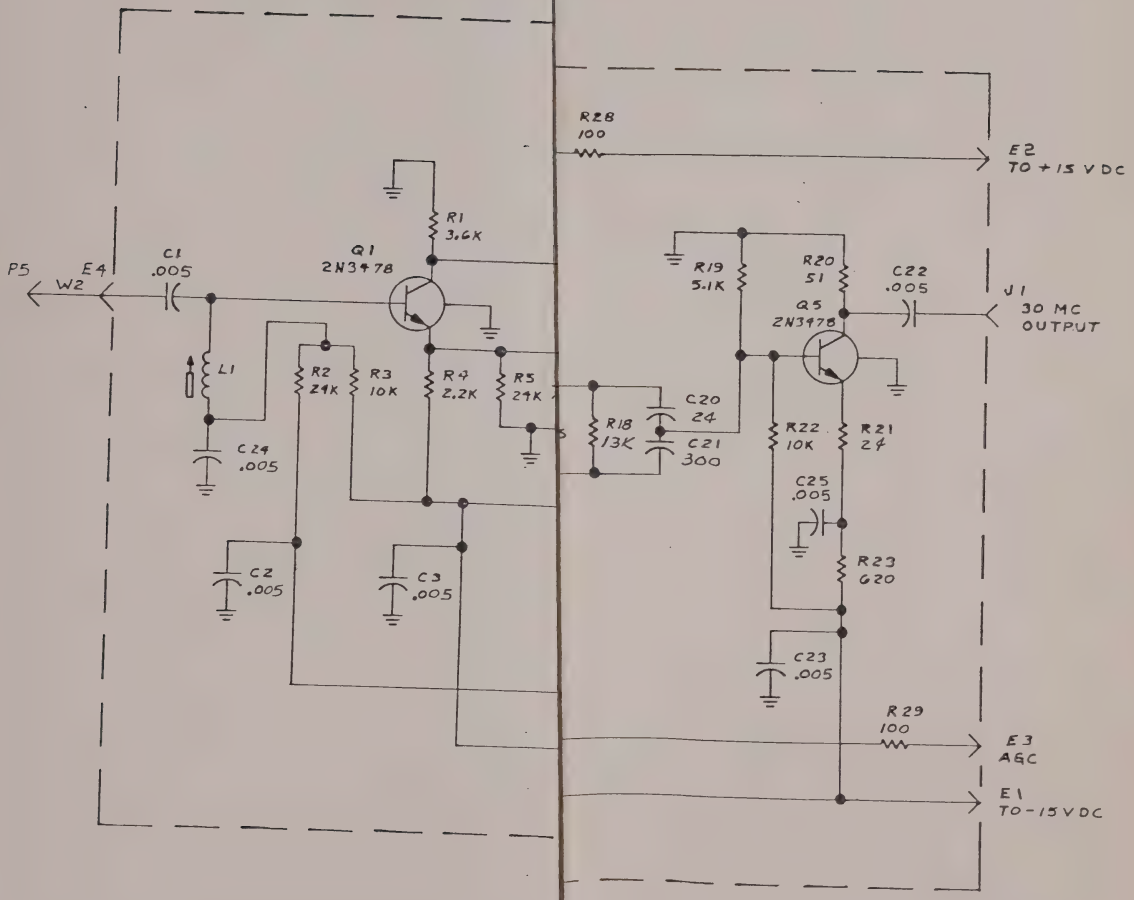

Fig 8-5/8-6

Figure 8-2. A1, 30 Mc Preamplifier, Schematic Diagram D32223

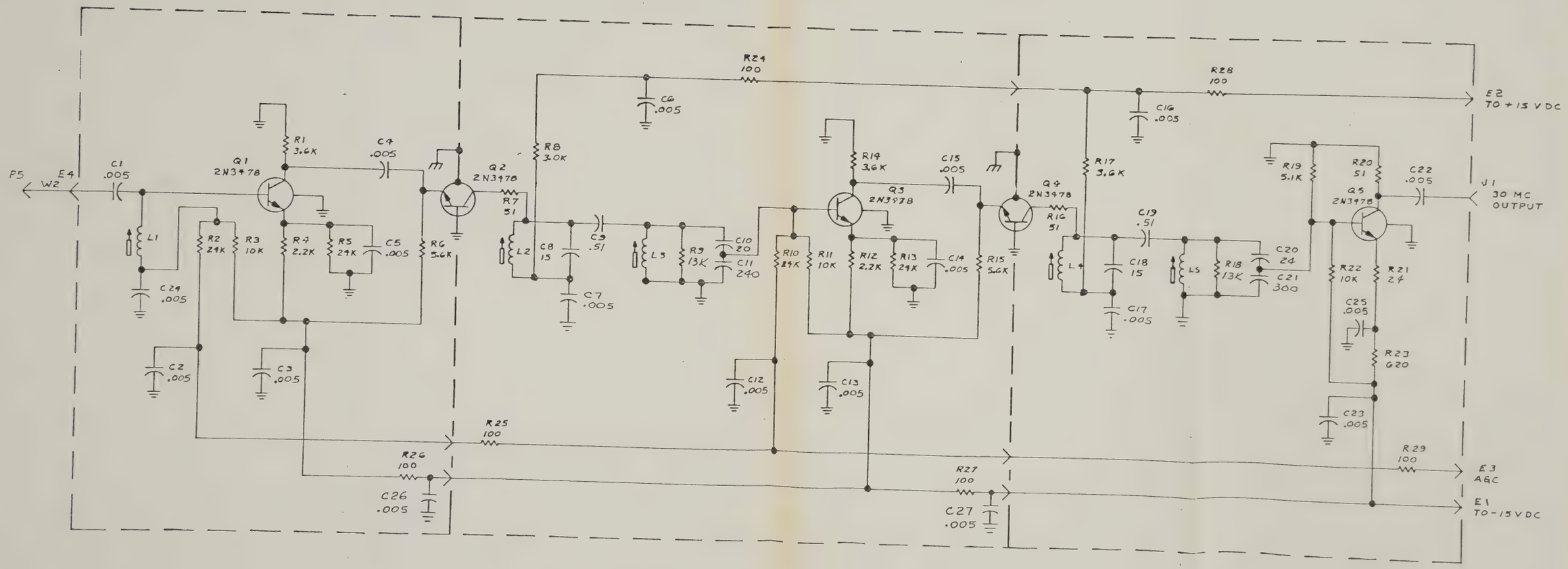

Fig 8-5 /8-6

Figure 8-2. A1, 30 Mc Preamplifier, Schematic Diagram D32223

NOTE

The Model RTH-F18B RF Tuning Unit is a modified version of the Model RTH-F18 RF Tuning Unit. The modification is given in detail on pages Add 1 and Add 2.

INSTRUCTION MANUAL

MODEL RTH-F18B RF TUNING UNIT

designed for use with the
Model TMR-18B Telemetry Receiver

23 February 1966

Defense Electronics, Inc.
Rockville, Maryland